REMARKS

Reconsideration of the issues raised in the above referenced Office Action is respectfully solicited.

Applicant appreciates that the amended Abstract and amended specification have been approved. Further, Applicant appreciates the withdrawal of the rejection of claims under 35 USC §112, second paragraph, as being indefinite.

Turning to the claims, Applicant notes that newly cited U.S. Patent No. 6 723 914 to Cadden has been applied, in combination with previously cited patents, to reject the claims.

Non-elected Claims 36-47 have been canceled in favor of Claims 48-59. Claims 48-59 do not recite "a brazing disc" and thus correspond to original elected Claims 1-18. Examination of added Claims 48-59 is respectfully requested.

The rejection of Claims 1-4, 9, 15, 16 and 18 under 35 USC §103 as being unpatentable over Foerster, U.S. Patent No. 3 444 613 in view of Cadden, U.S. Patent No. 6 732 914 has been considered.

Foerster discloses a method of joining carbide to steel. Specifically, Foerster discloses joining carbide tips, inserts and the like to shanks, dies or the like. To join the steel shank and cutting head a mixture of nickel powder and an alloy powder formed as a disc or wafer is interposed between the carbide tip and the shank. The assembly is then heated to cause the disc or wafer to join the elements by brazing.

As disclosed at column 2, lines 29-32 of Foerster, the use of a structure chiefly of nickel with regulated porosity can "absorb stresses formed on cooling, due to the differences in linear expansion of the martensitic die steel shank and the carbide tip". The regulated porosity refers to the blended powders. The regulated porosity presumably is homogeneous throughout the wafer or disc. Thus, Foerster discloses the basic concept of having a tool shank and carbide tip that are joined by a wafer, disc or other element by induction brazing

at a high temperature. Therefore, the basic concept of brazing to join elements is disclosed by Foerster.

Applicant's Claim 1 is directed to the same general concept as Foerster. Claim 1, however, further recites a joining layer for joining the tool shank and the cutting head that is made of ductile brazing material at joining surfaces, and "powder particles made of a temperature-resistant material having a lower coefficient of thermal expansion than the brazing material being embedded in the joining layer, wherein the joining layer has a different coefficient of thermal expansion over its layer thickness, the coefficient of thermal expansion of the joining layer being lowest on the side of the cutting head". Thus, Applicant's Claim 1 emphasizes the different coefficients of thermal expansion over its layer thickness, and specifically the coefficient of thermal expansion being "lowest on the side of the cutting head". This difference in the coefficient of thermal expansion is not disclosed in Foerster. There is no disclosure or suggestion anywhere in Foerster of having a different coefficient of thermal expansion at either side of the joining layer. "Regulated porosity" in view of the disclosure of creating the preforms in Foerster simply amounts to a uniform powder mixture for the joining disc.

Cadden discloses a braze system and method for reducing strain in a brazed joint. Cadden creates a composite brazed joint for joining a metal member and a ceramic member. The brazed joint has an intermediate foil structure or wafer 14 that is not melted in use. Instead, the wafer 14 forms a mechanically fixed intermediate transition layer sandwiched between layers 12, 13 formed of brazing material. The layers 12, 13 are each brazed to one side of the wafer 14.

Figure 1 of Cadden shows the wafer 14 corresponding to the foil with brazed alloys 12, 13 on opposing sides thereof. The brazed alloys 12, 13 of course, are then the heat melted or brazed to the structures 10, 11.

During installation, the composite braze joint 12, 13, 14 is heated so that the layers 12, 13 thereof join to the metal structure and the ceramic structure, respectively. The foil or wafer 14, however, has a high coefficient of thermal expansion and thus does not melt and is otherwise not affected by the brazing of the alloys 12, 13 to the structures 10, 11.

As best understood, the layers 12 and 13 can have different coefficients of thermal expansion. The coefficients of thermal expansion for the layers 12, 13 are clearly less than the coefficient of thermal expansion for the wafer 14, which does not melt during the joining of the structures 10, 11 on the opposing sides of the braze joint.

The Office Action relies on Cadden for the teaching of modifying the joining layer of Foerster to include a different coefficient of thermal expansion over its layer thickness. Applicant traverses this combination. As discussed above, Cadden discloses a central foil or wafer 14 and layers 12, 13 with different coefficients of thermal expansion on opposing sides thereof. Cadden does not disclose or suggest varying the density of powder particles over the thickness of the joining layer. Instead, on opposing sides of the foil 14, each of the layers 12, 13 presumably has a different constant coefficient of thermal expansion along the thickness thereof.

Applicant's Claim 1 recites that "the coefficient of thermal expansion of the joining layer being lowest on the side of the cutting head". This arrangement differs from the arrangement of Foerster, wherein a constant coefficient of thermal expansion is provided for the disc that joins the carbide element and support member. Further, in Cadden, the wafer or foil 14 has the lowest coefficient of thermal expansion of the layers 12, 14, 13. Thus, the coefficient of thermal expansion is not lowest on the side of the cutting head in Cadden, as the lowest coefficient of thermal expansion is in the center thereof. Further, modifying Foerster to include the braze joint of Cadden would result in a joint

structure having the lowest coefficient of thermal expansion in the center of the joint.

Further, Applicant's Claim 2 recites that "the density of the powder particles varies over the entire thickness of the joining layer". As discussed above, the density of powder particles in Foerster is the same throughout the entire thickness thereof. In Cadden, the density of powder particles does not vary over the entire thickness of the joining layer. Instead, different densities are provided for the layers 12 and 13. While the layers 12, 13 have different densities, across the thickness of each individual layer 12, 13 the density is the same.

For the above reasons Claim 1, and Claims 2-4, 9, 15, 16 and 18 dependent therefrom, are distinguishable over Foerster in view of Cadden.

The rejection of Claims 4-6 and 8 under 35 USC §103 as being unpatentable over Foerster in view of Cadden, and further in view of Guhring, U.S. Patent No. 4 704 055 has been considered.

Guhring discloses a tool shank made from tool steel along with a titanium nitride coating.

Guhring does not disclose or suggest the concept of providing a joining layer having a different coefficient of thermal expansion over its layer thickness, much less the coefficient of thermal expansion being lowest on the side of the cutting head as recited in Claim 1.

Thus Guhring does not address the deficiencies in the rejection of Claim 1 based on Foerster and Cadden.

For the reasons set forth above with respect to parent Claim 1, Claims 4-6 and 8 are allowable over Foerster, Cadden and Guhring.

The rejection of Claims 13 and 14 under 35 USC §103 as being unpatentable over Foerster in view of Cadden, and further in view of Guhring has been considered.

As discussed above with respect to Claims 4-6 and 8, Guhring does not address the deficiencies of Foerster and

Cadden with respect to Claim 1. Therefore, Claims 13 and 14 are allowable over Foerster, Cadden and Guhring for the reasons discussed above with respect to parent Claim 1.

The rejection of Claim 7 under 35 USC §103 as being unpatentable over Foerster in view of Cadden and further in view of Guhring has been considered. Claim 7 is allowable for the reasons set forth above with respect to parent Claim 1.

Further, Claim 7 now recites that the joining layer "consists of said ductile brazing material and said powder particles". This arrangement differs from Cadden, which includes the central wafer 14 made from different materials. Therefore, Claim 7 distinguishes over Foerster, Cadden and Guhring.

The rejection of Claims 10-12 under 35 USC §103 as being unpatentable over Foerster and Cadden, and further in view of Nagel, U.S. Patent Publication No. 2002/0009340 has been considered.

Nagel discloses a deep-hole drilling tool and method for manufacturing thereof which includes a drill head 12 that is preferably brazed to a drill shank 13. The drill head and drill shank can have conical seats that match for seating the parts before brazing occurs.

Nagel does not disclose or suggest providing a joining layer that has "a different coefficient of thermal expansion over its layer thickness", much less "the coefficient of thermal expansion of the joining layer being lowest on the side of the cutting head" as recited in Claim 1. Thus, Nagel does not address the deficiencies of Foerster and Cadden with respect to Claim 1.

Further there is no motivation, absent Applicant's specification, to again modify the brazed joint of Foerster, which has already been modified by the brazed joint of Cadden, except in order to obtain Applicant's claimed invention.

For the above reasons, Claims 10-12 distinguish over Foerster in view of Cadden and Nagel.

The rejection of Claim 17 under 35 USC §103 as being unpatentable over Foerster in view of Cadden has been considered. Claim 17 is allowable for the reasons set forth above with respect to parent Claim 1.

New Claims 49-60 also distinguish the prior art.

Claim 48 recites a cutting tool having a tool shank and a cutting head, along with "the coefficient of thermal expansion of the joining layer being lowest on the side joining the cutting head". As discussed above, this feature is not present in the prior art.

Claim 49 recites that "the density of the powder particles varies over the entire thickness of the joining layer". Claim 49 is allowable for the reasons set forth above with respect to Claim 2.

For the above reasons Claim 48, and Claim 49 dependent therefrom distinguish the prior art.

Independent Claim 50 recites the joining layer "consisting of brazing material and powder particles embedded in the brazing material". Thus the joining layer recited in Claim 50 differs from the joining layer in Cadden, which requires a foil or wafer 14 of different material between the layers 12, 13 of brazing material.

Further, Claim 50 recites that "the joining layer has a different coefficient of thermal expansion over its layer thickness". As discussed above, this feature is not present in Foerster.

Moreover, if Cadden is combined with Foerster, which Applicant disagrees with, the resulting cutting tool joint would have a foil or wafer 14 and thus not "consist of" brazing material and powder particles embedded therein as recited in Applicant's Claim 50.

Claim 51 recites that "the density of the powder particles varies over the entire thickness of the joining layer". Thus, Claim 51 distinguishes the applied prior art for the reasons set forth above with respect to Claim 2.

Claim 59 recites that "the coefficient of thermal expansion of the joining layer is lowest on the joining layer adjacent the cutting head". Claim 59 is allowable for the reasons set forth above with respect to Claims 1 and 48.

For the above reasons Claim 50, and Claims 51-59 dependent therefrom, distinguish over the prior art.

Consideration and allowance of Claims 1-18 and 48-59 is respectfully requested.

Further and favorable reconsideration is respectfully solicited.

Respectfully submitted,

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